Research Assistant/ PDRA: Cultural Heritage Knowledge Graphs

Full Time
Fixed Term until June 2023
AC1/AC2
Walton Hall, Milton Keynes

The role

The Knowledge Media Institute (KMi) is looking for a Research Assistant or a Research Associate (depending on qualification), to work on EU funded projects – SPICE (http://spice-h2020.eu) and Polifonia (http://polifonia-project.eu).

The projects

The aim of SPICE is to research and develop innovative methods for Citizen Curation, including research on user interfaces with which museum visitors can be guided in developing their own interpretations and responses to artworks, for example as online collections or stories.
Within SPICE, KMi is also involved in developing the Linked Data infrastructure to connect cultural objects, collections, and citizen contributions. Such a platform will support developers of applications for citizen engagement in requesting and negotiating access to digital resources and exploiting a stack of intelligent services for content discovery, analysis, and tracing.

The aim of Polifonia is to build the European Knowledge Graph of Musical Heritage. The project involves research in novel methods to capture, analyse, and share musical knowledge by the means of linked data technologies.
KMi's role spans information extraction from unstructured content (texts and music) and developing innovative ways to apply knowledge graph for supporting research in musicology and cultural studies on music. Polifonia case studies include the historical experiences of music in relation to childhood (CHILD) and the development of a knowledge graph of musical encounters in Europe (MEETUPS).

The research

The candidate is expected to have a strong background in at least one of the following research areas, relevant to the projects:

- Privacy and Policy-aware Semantic technologies or Distributed Online Social Networks (DOSN)
- Information extraction (NLP, machine/deep learning) for knowledge graph construction
- User-centered data science and sense-making

Privacy and Policy-aware Semantic technologies or Distributed Online Social Networks (DOSN)

The candidate will research on novel, hybrid methods at the intersection with semantic web technologies and distributed online social networks. The research will build on the semantic web stack (e.g. SPARQL, Solid) and apply state of the art algorithms from the area of distributed online social networks to support a privacy and policy-aware data infrastructure. The resulting system will allow citizens' opinions, responses, and memories to be shared within safe channels preserving the privacy, ownership, and fair use of the resources involved.

Information extraction (NLP, machine/deep learning) for knowledge graph construction

The candidate is expected to research on novel, hybrid methods for knowledge graphs construction from unstructured sources. The research will build on state-of-the-art approaches in language technologies, machine/deep learning, and semantic web technologies. The candidate will develop innovative methods for extracting knowledge from unstructured resources (e.g. images, texts, and music) and generating knowledge graphs to support scholarship in the humanities. The candidate will focus on how cultural content can be captured, represented, and shared between heritage institutions, scholars, and the public.

User-centered data science and sense-making

The candidate is expected to support the co-design and implementation of novel interface tools that support end-users (e.g. music scholars, members of the public) in interacting with musical resources (e.g. music scores, text, audio) and their associated knowledge graphs. This research will go beyond conventional search and navigation techniques to reveal rich interconnections represented in the knowledge graph (e.g. between musical artefacts, composers, genres, times and locations). New forms of search will be developed for expressing complex queries without the need to understand underlying formal query languages. Visualizations will be developed to support users in understanding trends in music over space and time.

The work will involve:

- gathering data and developing prototypes;
- collaboratively designing experiments;
- collaboratively designing user interfaces;
- developing end-user software implementing the research approach;
- training and testing (machine learning) models;
- conducting and analyzing experimental data;
- moving prototypes into a production environment
- attend/travel to meetings with project partners

The candidate will work with the KMi team involved in SPICE and Polifonia, under the supervision of Enrico Daga.

Person Specification

Essential

- Research experience in one of the following areas:
  - (a) Semantic technologies or Distributed Online Social Networks
  - (b) Information extraction (NLP, machine/deep learning)
  - (c) User-centered data science and sense-making
- Strong software and Web development skills
- Proficiency with one of the following programming languages: PHP, Java, JavaScript, Python;
- Proven ability to fit into the OU's Computer Science REF profile (publications in highly rated conferences or journals relevant to the field);
- Ability to quickly demonstrate understanding of the project aims and specific tasks as requested;
- Self-starter in providing solutions to meet project needs;
- Ability to work in complex team relationships;
- Excellent written and oral communication skills;
- Work to challenging targets and deadlines;
- Ability to handle constructive feedback.

Desirable

- Experience with Semantic Web technologies
- Experience with developing digital cultural heritage tools
- Experience with python frameworks for natural language processing, including machine learning techniques applied to NLP tasks
- Experience with data science and machine learning technologies
- Experience in designing and conducting large scale evaluation studies (including simulations and synthetic data)
- Experience in developing and evaluating systems for visualization and exploration of complex data

If you would like further details about the role before making an application then please email your query through to Resourcing-Hub@open.ac.uk or contact (insert name of RA and direct telephone number)

About the Unit

STEM

Faculty of Science, Technology, Engineering & Mathematics
The Faculty of Science, Technology, Engineering and Mathematics (STEM) is comprised of:

- School of Computing & Communications
- School of Environment, Earth & Ecosystem Sciences
- School of Engineering & Innovation
- School of Life, Health & Chemical Sciences
- School of Mathematics & Statistics
- School of Physical Sciences
- Knowledge Media Institute
- Deanery including teams supporting Curriculum; Research, Enterprise and Scholarship; Laboratory Infrastructure; and Faculty Administration

"We aspire to be world leaders in inclusive, innovative and high impact STEM teaching and research, equipping learners, employers and society with the capabilities to meet tomorrow's challenges"

The Faculty of STEM consists of 2500 staff including 1,800 Associate Lecturers. The Faculty delivers over 185 modules across undergraduate and postgraduate curriculum, supporting nearly 19,000 students (full time equivalents) which is 29% of the OU total.

The Faculty generates more research income (circa £17M) than any other Faculty in the University, supported by a comprehensive laboratory infrastructure.

We are proud of our distinctive values and capabilities underpinning our aspiration:

We are inclusive:
- We transform people's lives, ensuring STEM education is openly accessible to many thousands of students from diverse backgrounds – our students express high satisfaction with their study experience.
- We engage the public in exciting citizen science and engineering, including through free open educational resources, multi-platform broadcasting, outreach to inspire the next generation and with programmes to encourage more women into STEM.

We are highly innovative:
- We are at the forefront of innovative developments in teaching practical science and engineering at a distance, through simulated and remote access laboratories and practical experimentation.
- Our high quality teaching and curriculum are informed by world-leading research, strong links with professional bodies and communities of practitioners, as well as by scholarship focused on continuously improving our STEM pedagogy.

We deliver significant social and economic impact:
- We provide STEM higher education at a scale and reach unsurpassed in the UK, with a sizeable international reach and further growth potential.

- We inject transferable STEM skills and knowledge direct into the workplace for immediate employee and employer benefit, as students combine study while working.
- The employability value of our courses is underpinned by accreditation from leading STEM Professional Bodies and Learned Societies, as well as partnerships and sponsorship with leading employers.
- Our high quality, applied and academically relevant teaching and research addresses real-world issues, delivering impact for industry and society, including addressing pressing STEM skill-shortages across the UK.

KMi

The Knowledge Media Institute (KMi) of the UK's Open University is a highly successful interdisciplinary research centre founded at The Open University in 1995, and located in attractive premises at The Open University's main campus in Milton Keynes, UK. We offer a stimulating environment, widely acknowledged to be at the leading edge of research and development, particularly in Semantic Technologies, Human Computer Interaction, New Media and Information Retrieval. The style, impact and content of our work can be seen at http://kmi.open.ac.uk/. Information on careers in KMi can be found at: http://kmi.open.ac.uk/careers/

"Our lab values diversity and is committed to equality of opportunity. We would particularly welcome applications from women, since women are, and have historically been, underrepresented on our academic staff."

Key Publications relating to the project

Bruni, Luis Emilio; Daga, Enrico; Damiano, Rossana; Diaz, Lily; Kuflik, Tsvi; Lieto, Antonio; Gangemi, Aldo; Mulholland, Paul; Peroni, Silvio; Pescarin, Sofia and Wecker, Alan (2020). Towards Advanced Interfaces for Citizen Curation. In: AVI2CH 2020: Workshop on Advanced Visual Interfaces and Interactions in Cultural Heritage, 29 Sep 2020, Ischia, Italy.

Daga, Enrico, and Enrico Motta. "Capturing themed evidence, a hybrid approach." In Proceedings of the 10th International Conference on Knowledge Capture, pp. 93-100. 2019.

Daquino, Marilena, Enrico Daga, Mathieu d'Aquin, Aldo Gangemi, Simon Holland, Robin Laney, Albert Merono Penuela, and Paul Mulholland. "Characterizing the landscape of musical data on the Web: State of the art and challenges." (2017).

Daga, Enrico, and Enrico Motta. "Challenging knowledge extraction to support the curation of documentary evidence in the humanities." (2019).

Daga, Enrico, Mathieu d'Aquin, Aldo Gangemi, and Enrico Motta. "Propagation of policies in rich data flows." In Proceedings of the 8th International Conference on Knowledge Capture, pp. 1-8. 2015.

Warren, Paul and Mulholland, Paul (2020). A comparison of the cognitive difficulties posed by SPARQL query constructs. In: Knowledge Engineering and Knowledge Management. EKAW 2020. Lecture Notes in Computer Science, vol 12387 (Keet, C. M. and Dumontier, M. eds.), Springer, Cham.